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A COMPARISON OF ZINC PHOSPHIDE AND STRYCHNINE OAT BAITS FOR CONTROLLING NORTHERN POCKET GOPHERS

By

Monty Sullins
Agricultural Specialist

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Abstract:

Plots treated with zinc phosphide and strychnine oat baits were compared for efficacy in reducing northern pocket gopher (*Thomomys talpoides*) activity. Baits were applied in crisscross and parallel patterns using a mechanical burrow builder. The reductions in activity were 50 and 53 percent for the zinc phosphide plots and 57 and 63 percent for the strychnine plots. Amount of bait and time for application were also reported.

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INTRODUCTION

The northern pocket gopher (*Thomomys talpoides*) is found throughout most of Montana and in most cultivated and agricultural areas is considered a pest species causing significant damage. Such damage consists of consumption and destruction of crops such as alfalfa, vegetables, and ornamentals , reduction of yields, sites for weed establishment because of the presence of soil mounds, and damage to tree plantings, irrigations systems, and hay equipment.

Controls to reduce such damage have traditionally consisted of using a mechanical burrow builder to apply toxic grain baits to large acreage infested with gophers and hand baiting or using various types of traps for smaller areas. Cultural practices such as flood irrigation and crop rotation also have been used.

Applicators often report poor or variable results using various formulations of the rodenticides strychnine, zinc phosphide, and anticoagulants currently registered by U.S. Environmental Protection Agency and the Montana Department of Agriculture for the control of pocket gophers. Specific reasons for this poor efficacy are not totally understood.

Personal communications with Dale Hackman, Hacco, Inc.[1], manufacturer of Hacco rodent baits, revealed that some promising results in controlling pocket gophers were being obtained in the midwestern U.S. and Canada applying zinc phosphide bait with mechanical burrow builders using a crisscross baiting pattern. Since zinc phosphide has not previously been known to be effective for pocket gopher control, I indicated interest in conducting field trials to test the efficacy of this control in Montana.

OBJECTIVES

The objectives of this study were to determine the efficacy of zinc phosphide oat bait when compared to strychnine for controlling pocket gophers and to see if crisscross baiting patterns improved efficacy.

STUDY AREA

The study area was established 4 miles south of Bridger, Montana. Test plots were established in a pivot irrigated alfalfa field infested with pocket gophers. Other agricultural crops in the area consist of sugar beets, corn, small grains, pasture, and rangeland. Soil type is sandy, clay loam. The study was conducted from March 21 to April 4, 1997.

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[1] Hacco, Inc., P.O. Box 7190, Madison, WI 53707

METHODS

Four 10 acre treatment plots and one 10 acre control plot were selected within the study area. Two of these plots (A and B) each received a treatment of 2.0 percent zinc phosphide oats applied in a crisscross pattern. Plot C was similarly treated using 0.5 percent strychnine oats. Plot D was also treated with the same strychnine bait but applied in parallel burrow patterns. Plot E was the no treatment control.

Bait was applied using a tractor drawn 3-point hitch Elston[2] burrow builder. All burrows (crisscross or parallel) were spaced 15 to 20 feet apart. Only that portion of the plots containing pocket gopher mounds were baited. A fifty-foot buffer was also baited between adjacent plots and beyond plot boundaries to minimize emigration of pocket gophers from immediate surrounding burrow systems.

Efficacy was determined by comparing active burrow counts pre and post treatment. Twenty active gopher burrow systems were selected at random on each plot. A minimum distance of 40 feet between active systems was maintained. Burrow systems were flagged and census holes opened three days before and after bait treatment. Any census burrow not replugged within 48 hours after opening was considered inactive. The control plot was similarly monitored to insure that pocket gopher activity on the study site was not significantly affected by factors other than bait treatment.

Percent reduction in activity was calculated using the formula:

$$\text{Percent reduction in activity} = 1 - \frac{\begin{array}{c}\text{Holes closed posttreat}\\ \text{(Treatment plot)}\end{array} \times \begin{array}{c}\text{Holes closed pretreat}\\ \text{(Control plot)}\end{array}}{\begin{array}{c}\text{Holes closed pretreat}\\ \text{(Treatment plot)}\end{array} \times \begin{array}{c}\text{Holes closed posttreat}\\ \text{(Control plot)}\end{array}} \times 100$$

Man-hours required for baiting and amounts of bait applied were also recorded for each plot.

RESULTS AND DISCUSSION

The data obtained in this study are summarized in Table 1.

The zinc phosphide and strychnine baits tested in this study produced similar efficacies (50 to 63 percent). Those of the strychnine plots (57% for crisscross and 63% for parallel) were slightly higher than the two zinc phosphide crisscross plots (50% and 53%). However, all efficacies were considered poor. Any relief from pocket gopher damage at this level would be minimal and short term. Pocket gophers can easily replace such reduction in numbers within one breeding season with damage reaching or exceeding previous levels.

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[2] Rue R. Elston, Inc., 706 North Weber, Sioux Falls, SD 57102

TABLE 1. Percent reduction in activity, amount of bait applied, and time required for application when baiting pocket gophers with zinc phosphide and strychnine oat baits.

Plot	Treatment	Bait Applied(lbs)	Baiting Time(man-hours)	Percent Reduction(%)
A	zinc phosphide(1)	28.0	3.25	50.0
B	zinc phosphide(1)	15.5	3.00	53.0
C	strychnine(1)	33.0	2.75	57.0
D	strychnine(2)	14.0	1.50	63.0
E	control	-	-	-

(1)Crisscross baiting pattern.
(2)Parallel baiting pattern.

The amount of bait used varied depending on the density and distribution of pocket gopher burrow systems but was applied at the rate of approximately two to three pounds per acre. The crisscross baiting pattern required twice the amount of bait and twice the labor to apply the bait as compared to parallel baiting. In this study, the increased amount of bait and time did not result in higher efficacy. In fact, the parallel pattern of baiting yielded the highest efficacy of any of the treated plots (63%).

The findings of this study apparently differ from those reported by Hacco. One possible reason for the difference may be in the pre and post activity census methods. Other field trials used mound counts as a means of determining pocket gopher activity. This mound forming activity can vary considerably depending on season and environmental conditions. Often pocket gophers can be trapped in burrow systems where no new mounds exist. The plugged hole technique to monitor pocket gopher activity relies on the habit of pocket gophers to live in a closed burrow system, plugging all open entrances. This technique was chosen as a census method for this study because it was considered to be a more accurate indicator of pocket gopher activity.

RECOMMENDATIONS

Since the results shown here are from one study, it is impossible to arrive at specific conclusions or recommendations regarding any advantage of using zinc phosphide bait applied in crisscross patterns to control pocket gopher damage. Further testing and field use results using similar census methods are needed.

ACKNOWLEDGMENTS

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